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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER
CHANG, AUDREY Y

ART UNIT	PAPER NUMBER
2872	

DATE MAILED: 08/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/842,935	KOZHUKH, MICHAEL	
	Examin r	Art Unit	
	Audrey Y. Chang	2872	

-- The MAILING DATE of this communication app ars on th cover sheet with the correspond nc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 May 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,8-13,16,17,19 and 23-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,8-13,16,17,19 and 23-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Remark

- This Office Action is in response to applicant's amendment filed on May 27, 2003, which has been entered as paper number 11.
- By this amendment, the applicant has amended claims 16, 19 and has canceled claims 18 and 20-22.
- Claims 1-6, 8-13, 16-17, 19, and 23-30 remain pending in this application.

Claim Objections

1. Claim 24 is objected to because of the following informalities: it depends from a canceled claim, which makes the scope of claim unclear. Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-6, 8-10, 12-13 and newly amended claims 16-17, 19 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Li et al (PN. 5,619,059) in view of the patent issued to Oyama et al (PN. 6,572,990).

Li et al teaches a *color deformable mirror device* (10) having a plurality of electronically controlled *micro-mirrors* that each is comprised of a *mirror element* (16, Figure 1) with a color mirror

(34). The color mirror (34) is comprised of a mirror *substrate* (22), which can be made of *semiconductor material such as silicon*, (please see column 6, lines 41-43), and *an optical thin film interference color coating* (24) formed on top of the mirror substrate, wherein a high reflectance *silver layer* (26) is ***directly*** formed on top of the silicon mirror substrate as shown in Figure 1, (please see column 6, lines 44-50).

Li et al further teaches that the optical thin film interference *color coating layer* (24), having multilayer structure design, is capable of enhancing reflection and *absorption* of light incident upon the coating, (please see column 6, lines 15-40) and in particularly it includes *absorbing layers* (30 and 32, please see column 5, lines 49-51) and *transparent layer* (28) that can be formed by layer materials such as *silicon dioxide* and *silicon nitride* dielectric materials, (please see column 6, lines 55-58). The interference coating including the absorbing layers are formed over the silver layer such that the interference coating is designed to reflect red, blue or green color of light. It is implicitly true that the interference coating is also absorbing color of light that is not intended for reflection which implicitly including the absorption of blue light, (please see Figures 1 and 2, columns 5-6). The method of forming the color deformable mirror device is in implicitly included.

This reference has met all the limitations of the claims with the exception that it does not teach explicitly that the layer thickness for the absorbing layer components in the interference coating is between 700 to 750 Angstroms. However Li et al does teach that by varying the thickness of the layers in the interference coating different reflection characteristics and implicitly different absorption characteristics, in order to obtain optimum performance, can be achieved, (please see column 6, lines 27-36). Furthermore, **Oyama** et al in the same field of endeavor teaches *an absorbing layer* that is comprised of a transparent nitride film, which includes *silicon nitride*, with a thickness ranged between 40 to 80 nm or 400 to 800 angstroms and an oxide film consisting essentially *silicon dioxide* film with a thickness of between 70 to 140 nm or 700 to 1400 angstroms, (column 4 lines 23-47, column 6 lines 36-40). It would then have been obvious to one skilled in the art to apply the teachings of Oyama et al to

modify the interference coating of Li et al to include the layer materials of silicon dioxide and silicon nitride with the thickness taught for the benefit of obtaining desired absorbing property for the interference coating.

With regard to claims 12 –13 and 24, Li et al teaches that the color-coating layer are formed by using *chemical vapor deposition process* (CVD) but it does not teach explicitly about the temperature used, (please see column 9). However this feature has to be either implicitly included or an obvious modification to one skilled in the art since the temperature setting is an essential and standard factor for carrying out the CVD process and it would be common knowledge to one skilled in the art to use proper temperature setting for forming the color coating.

With regard to claim 17, Li et al teaches that the color mirrors (34) in the deformable mirror device (DMD) are *micro-mirrors* that each can be switched on or off by driving electronics, (please see Figures 1-2).

4. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Li et al in view of the patent issued to Oyama et al as applied to claim 8 above, and further in view of the patent issued to Jerman et al.

The color deformable mirror device taught by Li et al in combination with the teachings of Oyama et al as described for claim 8 above have met all the limitations of the claim with the exception that it does not teach explicitly that the reflective silver layer is deposited at 50 ^{0}C. **Jerman** et al in the same field of endeavor teaches a micro-mirror having silver layer deposited on silicon wafer wherein the silver layer is deposited at **room temperature** (which is generally understood to be between 20 to 25 ^{0}C) in order to *minimize* their residual internal stress, (please see column 17, lines 6-8). It would then have been obvious to one skilled in the art to apply the teachings of Jerman et al to form the silver layer at room temperature for the benefit of reducing or minimizing the residual internal stress.

5. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over the patents issued to Li et al and Oyama et al as applied to claim 16 above, and further in view of the patent issued to Jerman et al.

The color deformable mirror device taught by Li et al in view of the teachings of Oyama et al as described for claim 16 above have met all the limitations of the claim with the exception that they do not teach explicitly that the silver layer is formed at a temperature below 50. **Jerman** et al in the same field of endeavor teaches an optical data storage system having a *plurality of micro-mirrors* (103) that each having a *silicon wafer* (691, Figure 10), serves as the *substrate* and a *reflective metal layer* such as *silver layer* (692) formed on the silicon substrate, wherein the silver metal layer is deposited at *room temperature* which is generally understood to be between 20 to 25 ^{0}C, to minimize the internal residual stress, (please see columns 17, lines 5-8). It would then have been obvious to one skilled in the art to apply the teachings of Jerman et al to form the silver layer in such manner at room temperature to minimize internal residual stress.

6. Claims 25-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over the paten issued to Li et al in view of the patent issued to Jerman et al.

Li et al teaches a *color deformable mirror device* (10) having a plurality of electronically controlled *micro-mirrors* that each is comprised of a *mirror element* (16, Figure 1) with a color mirror (34). The color mirror (34) is comprised of a mirror *substrate* (22), which can be made of semiconductor material such as silicon, (please see column 6, lines 41-43), and *an optical thin film interference color coating* (24) formed on top of the mirror substrate, wherein a high reflectance silver layer (26) is ***directly*** formed on top of the silicon mirror substrate as shown in Figure 1, (please see column 6, lines 44-50).

Li et al further teaches that the optical thin film interference *color coating layer* (24), having multilayer structure design, is capable of enhancing reflection and *absorption* of light incident upon the coating, (please see column 6, lines 15-40) and in particularly it includes *absorbing layers* (30 and 32, please see column 5, lines 49-51) and *transparent layer* (28) that can be formed by layer materials such as *silicon dioxide* and *silicon nitride* dielectric materials, (please see column 6, lines 55-58). The interference coating including the absorbing layers are formed over the silver layer such that the interference coating is designed to reflect red, blue or green color of light. It is implicitly true that the interference coating is also absorbing color of light that is not intended for reflection which implicitly including the absorption of blue light, (please see Figures 1 and 2, columns 5-6). The method of forming the color deformable mirror device is in implicitly included.

This reference has met all the limitations of the claim with the exception that it does not teaches explicitly that the silver layer is formed at temperature below 50 degree Celsius. Jerman et al in the same field of endeavor teaches to form the silver layer at room temperature for the benefit of minimizing the residual internal stress, (please see column 17, lines 5-8). It would have been obvious to ones killed in the art to adopt such depositing process for the benefit stated above.

With regard to claim 27, Li et al teaches that the interference coating is formed by using *chemical vapor deposition process* (CVD) but it does not teach explicitly about the temperature used, (please see column 9). However this feature has to be either implicitly included or an obvious modification to one skilled in the art since the temperature setting is an essential factor for carrying out the CVD process and it would be common knowledge to one skilled in the art to use proper temperature setting for forming the color coating.

7. **Claims 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Li et al and Jerman et al as applied to claim 25 above, and further in view the patent issued to Oyama et al**

The deformable mirror taught by Li et al in combination with the teachings of Jerman as described for claim 25 above have met all the limitations of the claims. Theses references however do not teach explicitly that the layer thickness for the layer components in the color-coating layer is of the claimed values.

This reference has met all the limitations of the claims with the exception that it does not teach explicitly that the layer thickness for the absorbing layer components in the interference coating is between 700 to 750 Angstroms. However Li et al does teach that by varying the thickness of the transparent layers in the interference coating different reflection characteristics and implicitly different absorption characteristics, which in order to obtain optimum performance, can be achieved, (please see column 6, lines 27-36). Furthermore, **Oyama** et al in the same field of endeavor teaches an absorbing layer that is comprised of a transparent nitride film, which includes silicon nitride, with a thickness ranged between 40 to 80 nm or 400 to 800 angstroms and an oxide film consisting essentially silicon dioxide film with a thickness of between 70 to 140 nm or 700 to 1400 angstroms, (column 4 lines 23-47, column 6 lines 36-40). It would then have been obvious to one skilled in the art to apply the teachings of Oyama et al to modify the interference coating of Li et al to include the layer materials of silicon dioxide and silicon nitride with the thickness taught for the benefit of obtaining desired absorbing property for the interference coating.

With regard to claim 30, Li et al teaches that the interference coating is formed by using *chemical vapor deposition process* (CVD).

Response to Arguments

8. Applicant's arguments filed on May 27, 2003 have been fully considered but they are not persuasive. The newly amended claims have been fully considered and addressed in the paragraph above.

9. In response to applicant's argument, which states that the cited Li reference does not teach any oxide layer and nitride layer the examiner respectfully disagrees for the reasons stated below. The applicant is once again respectfully directed to columns 5 and 6 of Li reference wherein the specific layer materials including silicon oxide and silicon nitride used to form the interference coating (24) including absorbing layers (30 and 32) is explicitly disclosed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 703-305-6208. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 703-305-0024. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Audrey Y. Chang
Primary Examiner
Art Unit 2872

A. Chang, Ph.D.
July 30, 2003